# Requirements Engineering

## (Summer 2019)

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http://homepages.uc.edu/~niunn/courses

# Today's Menu

**Last Seminar:**
ASN3

**This Seminar:**
Course Summary

ASN2 grading

The End!

# Using Different Communication Media in Requirements Negotiation

University of Victoria

UNIVERSITY OF CALGARY

IEEE Software

**GOALS:**

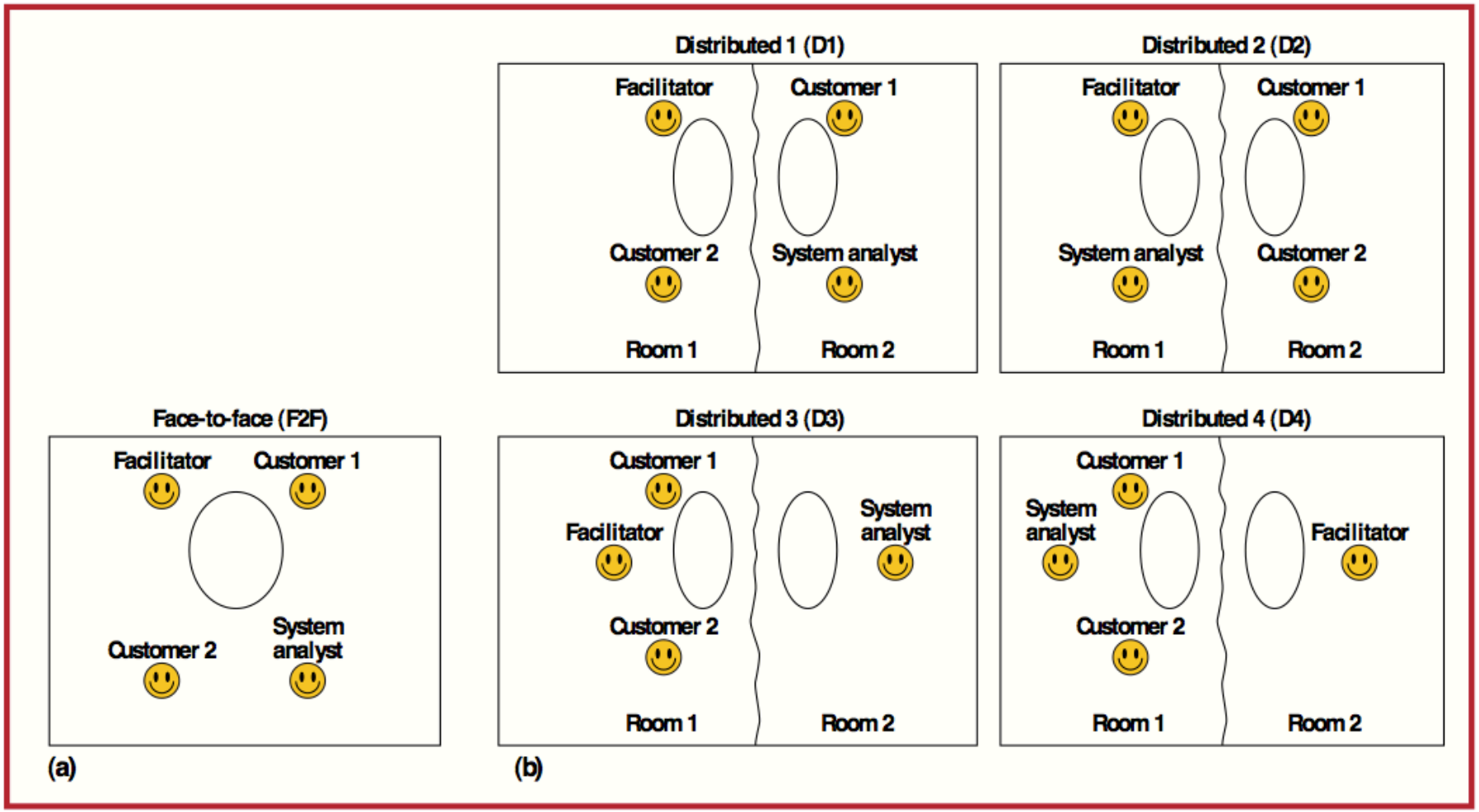
**(1) To investigate the communication media's effect on group performance in negotiating requirements; and**

**(2) To identify a setting that's most conductive to requirements negotiation.**



*Source:* https://ieeexplore.ieee.org/document/896247/

# Communication Media

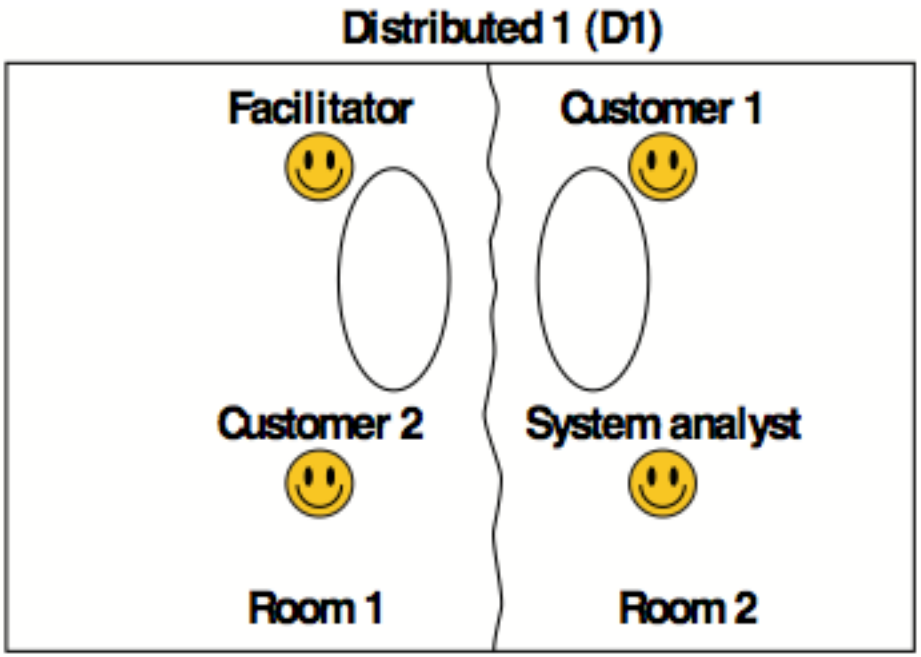





*Source:* https://ieeexplore.ieee.org/document/896247/

# Main Result

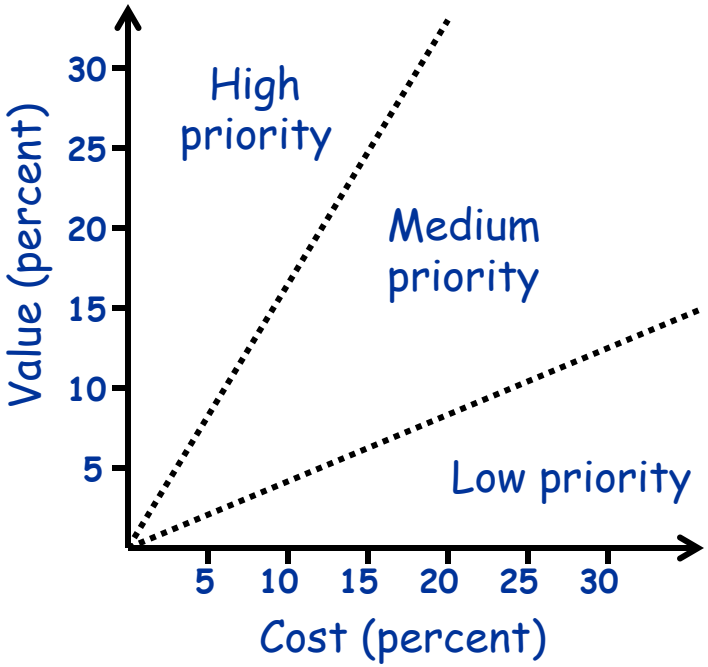
→ All groups in D1 reached agreements that were equal to or better than those in F2F groups.



# Desire to Satisfy One's Concern

# AHP as a Prioritization Method

- AHP: Analytic Hierarchy Process
- Usually there are too many requirements
  - Decide which to include in the first release
    - Balancing quality, cost and time-to-market
  - Assess each requirement's importance to the project as a whole
  - Assess the relative cost of each requirement
  - Compute the cost-value trade-off






***Source:*** *Adapted from Karlsson & Ryan 1997*

# AHP in Action

- Create n x n matrix (for n requirements)
- Compare each pair of requirements
  - For element (x,y) in the matrix enter:
    - 1 - if x and y are of equal value
    - 3 - if x is slightly more preferred than y
    - 5 - if x is strongly more preferred than y
    - 7 - if x is very strongly more preferred than y
    - 9 - if x is extremely more preferred than y
  - …and for (y,x) enter the reciprocal.
- Estimate the eigenvalues:
  - E.g. "averaging over normalized columns"
    - Calculate the sum of each column
    - Divide each element in the matrix by the sum of it's column
    - Calculate the sum of each row
    - Divide each row sum by the number of rows
- This gives a value for each requirement:
  - …based on estimated percentage of total value of the project



***Source:*** *Adapted from Karlsson & Ryan 1997*

# AHP Example

| | Req1 | Req2 | Req3 | Req4 |
|---|---|---|---|---|
| Req1 | 1 | 1/3 | 2 | 4 |
| Req2 | 3 | 1 | 5 | 3 |
| Req3 | 1/2 | 1/5 | 1 | 1/3 |
| Req4 | 1/4 | 1/3 | 3 | 1 |

Normalize columns

…Also: should compute the consistency index (because the pairwise comparisons may not be consistent)

| | Req1 | Req2 | Req3 | Req4 |
|---|---|---|---|---|
| Req1 | 0.21 | 0.18 | 0.18 | 0.48 |
| Req2 | 0.63 | 0.54 | 0.45 | 0.36 |
| Req3 | 0.11 | 0.11 | 0.09 | 0.04 |
| Req4 | 0.05 | 0.18 | 0.27 | 0.12 |

Sum the rows

| sum | sum/4 |
|---|---|
| 1.05 | 0.26 |
| 1.98 | 0.50 |
| 0.34 | 0.09 |
| 0.62 | 0.16 |



***Source:*** *Adapted from Karlsson & Ryan 1997*

# AHP in Theory

- More visible
  - Prioritization results in a graph, which also helps release planning
  - Either dimension is a ratio scale and $\Sigma=1$ (relative comparison)

- More robust
  - Redundancy ➔ reliability
    - In this case, pairwise comparisons ➔ less sensitive to judgmental errors
    - Consistency ratio (CR): the smaller, the better

As a general rule, a CR of 0.10 or less is considered acceptable.

# Your AHP Results

Value & Cost CR

Prioritization

Role Play

# Where did we start with?

- Requirements = stakeholder needs & desires

- Key RE activities
  - Plan and elicit
  - Model and analyze
  - Communicate and agree
  - Realize and evolve

# What does it take to be an expert?

A person needs to know about 50,000 chunks of information to be an expert in a field, where a chunk is any piece of knowledge that can be remembered rather than derived.

Steve McConnell

Body of Knowledge



***Source:*** *http://www.stevemcconnell.com/psd/05-BodyOfKnowledge.pdf*

# The meaning of requirements


P, C |- S

E, S |- R

("|-" means entailment)

RE is more concerned with this one

**Requirements engineers are an agent of change.**

# Req.s Elicitation vs. Req.s Gathering?

→Requirements ≠ What the customer said

→Requirements ≠

# Req.s Elicitation vs. Req.s Gathering?

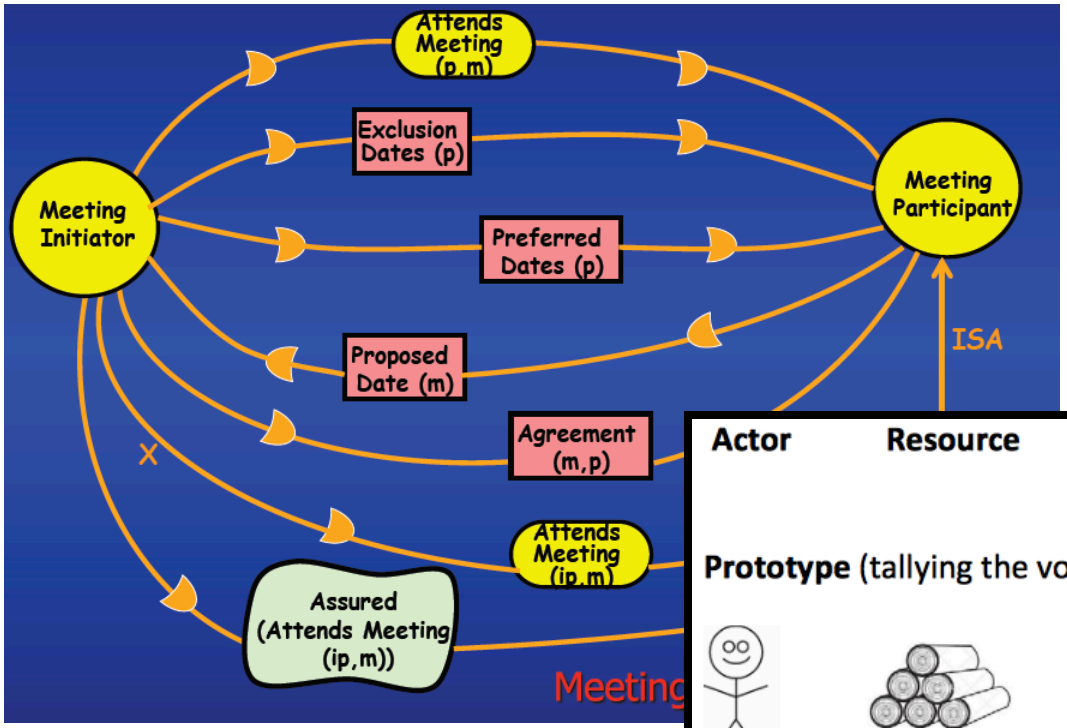
→ Requirements elicitation ≠ "asking the right questions"

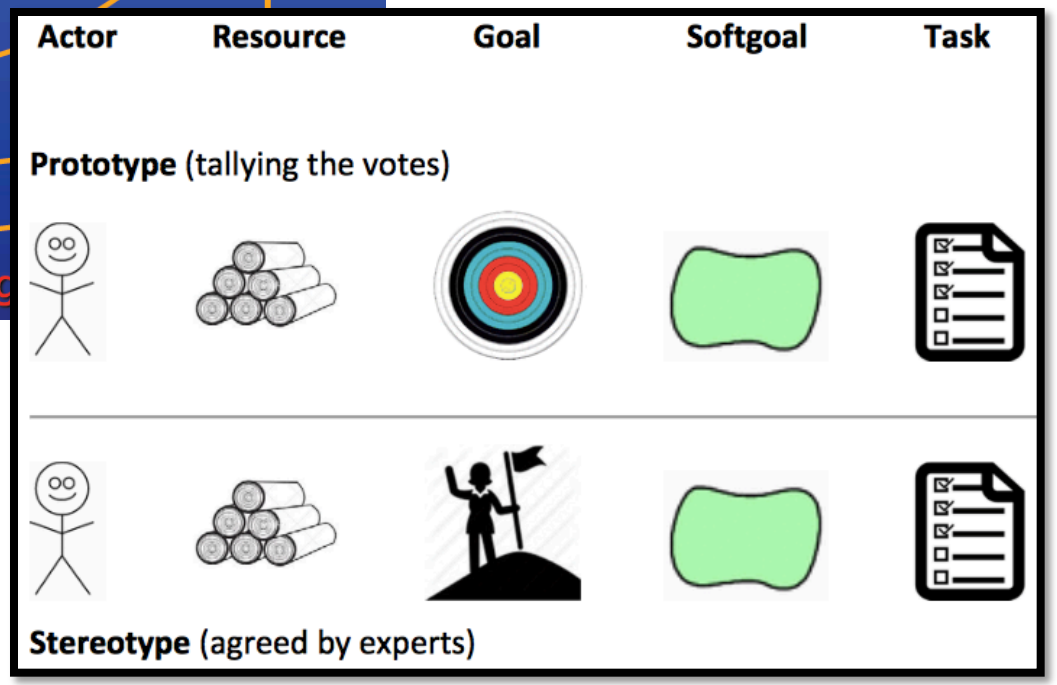
Because there's (1) no right question to ask, (2) no right stakeholder to ask the question, and (3) no right answer.

# Elicitation Techniques

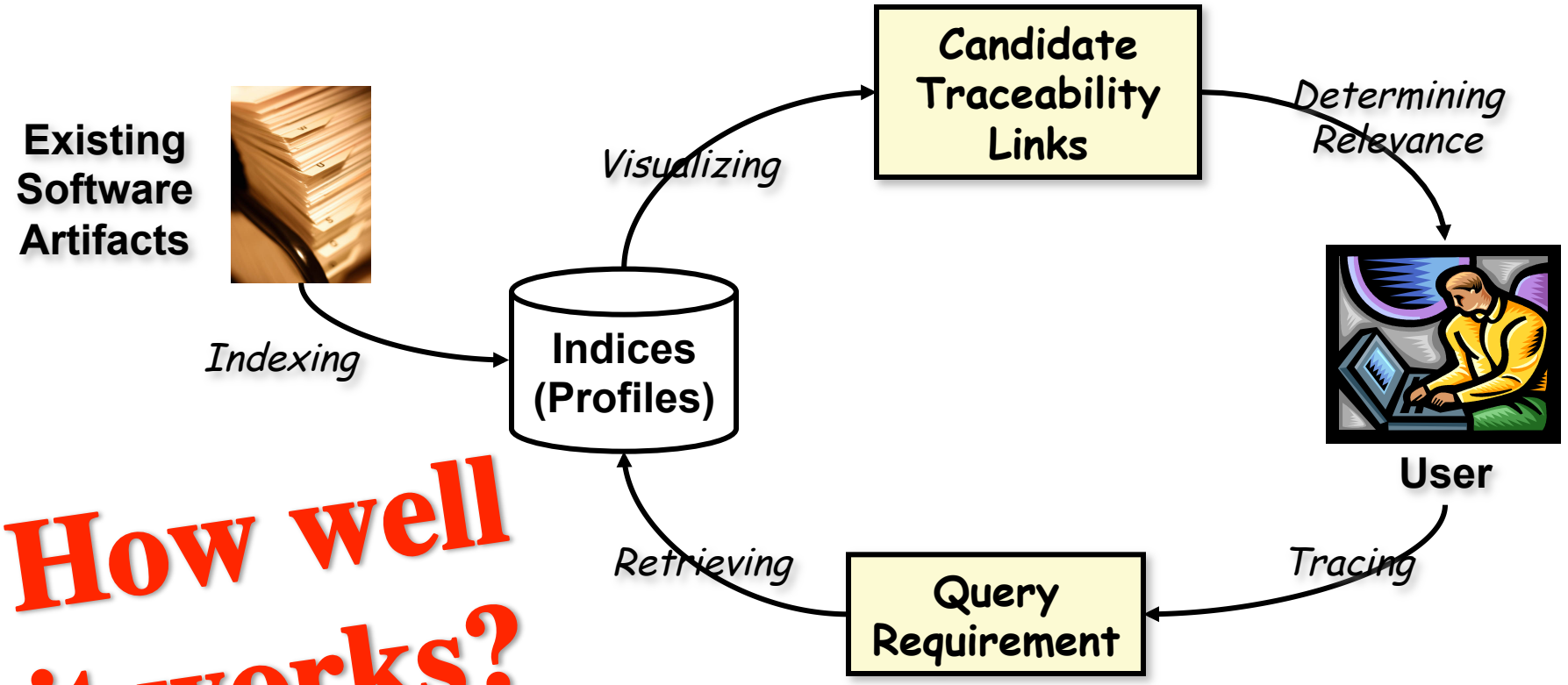
- → Traditional techniques
  - Introspection
  - Reading existing documents
  - Analyzing hard data
  - Interviews
    - Open-ended
    - Structured
  - Surveys / Questionnaires
  - Meetings
- → Collaborative techniques
  - Group techniques
    - Focus Groups
    - Brainstorming
  - JAD/RAD workshops
  - Prototyping
  - Participatory Design
- → Cognitive techniques
  - Task Analysis
  - Protocol Analysis
  - Knowledge Acquisition Techniques
    - Card Sorting
    - Laddering
    - Repertory Grids
    - Proximity Scaling Techniques
- → Contextual approaches
  - Ethnographic Techniques
    - Participant Observation
    - Ethnomethodology
  - Discourse Analysis
    - Conversation Analysis
    - Speech Act Analysis
  - Socio-technical Methods
    - Soft Systems Analysis

# Modeling is always "hot" in RE?



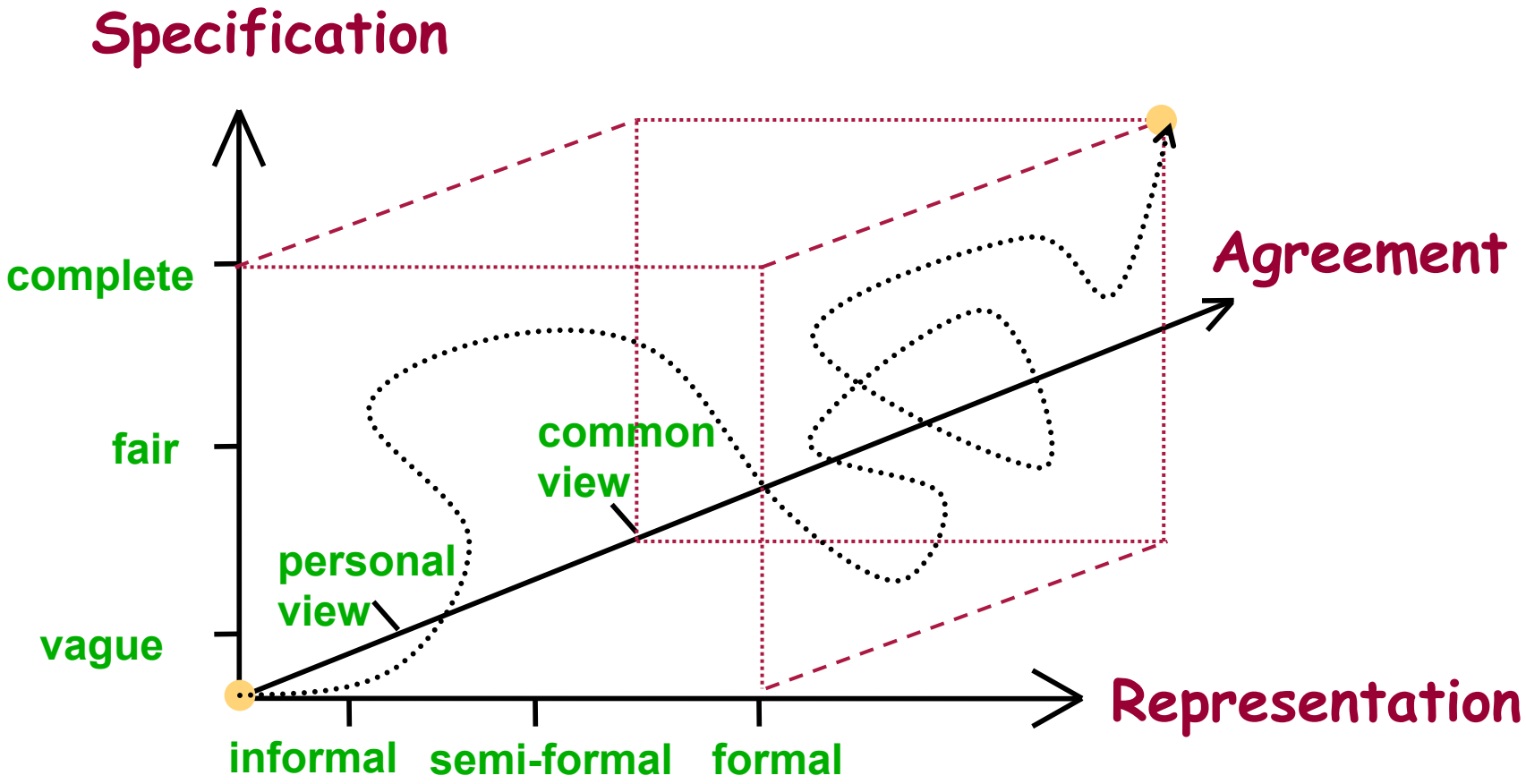



# Req.s don't (and shouldn't) live lonely




**How well it works?**

# A "Requirements Lifecycle"



# RE is all about STAKEHOLDERS

# Thank you all!

→ It's super fun to have you in the past week or so of my life. You are excellent students & I learned a lot from you!

→ Keep in touch & good luck!